

Claims

What is claimed is:

1. A system for recovering copper from a copper-containing material comprising:
a reactor, wherein said reactor is suitable for reacting at least a portion of a copper-containing feed stream with at least a portion of a copper-containing lean electrolyte stream in an acidic environment to yield a pressure leaching feed stream comprising a solid copper-bearing precipitate and acid;
a pressure leaching vessel, wherein said pressure leaching vessel is suitable for leaching at least a portion of said pressure leaching feed stream in an oxidizing environment at an elevated temperature and pressure to yield a product slurry comprising a copper-containing solution and a residue;
means for conditioning said product slurry without the use of solvent extraction techniques to yield a copper-containing solution suitable for electrowinning and a residue; and
an electrowinning circuit, wherein said electrowinning circuit is suitable for electrowinning copper from said copper-containing solution to yield cathode copper and a copper-containing lean electrolyte stream.
2. The system of claim 1 further comprising a liquid-solid separation circuit, wherein said liquid-solid separation circuit is adapted to separate at least a portion of said solid copper-bearing precipitate from said acid to yield a concentrated pressure leaching feed stream.
3. The system of claim 1 wherein said pressure leaching vessel is suitable for leaching at least a portion of said pressure leaching feed stream at a temperature of from about 100°C to about 250°C and at a pressure of from about 50 to about 750 psi.

4. The system of claim 1 wherein said reactor is suitable for reacting at least a portion of a copper-containing feed stream with at least a portion of a copper-containing lean electrolyte stream in the presence of sulfur dioxide, whereby at least a portion of said copper in said copper-containing lean electrolyte stream precipitates as copper sulfide onto at least a portion of the copper-containing material in said feed stream..

5. The system of claim 1 wherein said means for conditioning said product slurry comprises a liquid-solid separation circuit adapted to separate at least a portion of said copper-containing solution in said product slurry from said residue in said product slurry to yield a copper-containing solution suitable for electrowinning.

6. The system of claim 1 wherein said means for conditioning said product slurry comprises means for controlling the copper concentration of said copper-containing solution.

7. The system of claim 1 wherein said means for conditioning said product slurry comprises means for controlling the copper concentration of said copper-containing solution whereby the copper concentration of said copper-containing solution entering said electrowinning circuit is maintained at a level of about 40 grams/liter.

8. The system of claim 1 wherein said means for conditioning said product slurry comprises means for blending at least a portion of said copper-containing solution with at least a portion of one or more copper-containing streams to achieve a desired copper concentration in said copper-containing solution.

9. The system of claim 8 wherein said means for conditioning said product slurry comprises means for blending at least a portion of said copper-containing solution with at least a portion of a copper-containing lean electrolyte stream to achieve a copper concentration in said copper-containing solution of from about 20 to about 75 grams/liter.

10. The system of claim 1 further comprising means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning circuit to said reactor.

11. The system of claim 8 further comprising means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning circuit to said conditioning means.

12. The system of claim 8 further comprising means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning circuit to said reactor, and means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning circuit to said conditioning means.

13. A system for recovering copper from a copper-containing material comprising:
means for reacting a copper-containing material stream with a copper-containing lean electrolyte stream to produce an inlet stream comprising a copper-bearing precipitate and acid;
means for leaching at least a portion of said inlet stream to produce a product slurry comprising a copper-containing solution and a residue;
means for conditioning said product slurry without the use of solvent extraction techniques to produce a copper-containing solution acceptable for electrowinning; and
means for electrowinning copper from said copper-containing solution to produce a cathode copper product.

14. The system of claim 13 further comprising means for separating at least a portion of said solid copper-bearing precipitate from said acid to yield a concentrated inlet stream.

15. The system of claim 13 wherein said leaching means is suitable for leaching at least a portion of said inlet stream in an oxidizing environment at a temperature of from about 100°C to about 250°C and at a pressure of from about 50 to about 750 psi.

16. The system of claim 13 wherein said reacting means is suitable for reacting at least a portion of said copper-containing material stream with at least a portion of said copper-containing lean electrolyte stream in the presence of sulfur dioxide, whereby at least a portion of said copper in said copper-containing lean electrolyte stream precipitates as copper sulfide onto at least a portion of the copper-containing material in said copper-containing material stream.

17. The system of claim 13 wherein said means for conditioning said product slurry comprises a liquid-solid separation circuit adapted to separate at least a portion of said copper-containing solution in said product slurry from said residue in said product slurry to yield a copper-containing solution suitable for electrowinning.

18. The system of claim 13 wherein said means for conditioning said product slurry comprises means for controlling the copper concentration of said copper-containing solution whereby the copper concentration of said copper-containing solution entering said electrowinning circuit is maintained at a level of about 40 grams/liter.

19. The system of claim 1 wherein said means for conditioning said product slurry comprises means for blending at least a portion of said copper-containing solution with at least a portion of one or more copper-containing streams to achieve a desired copper concentration in said copper-containing solution.

20. The system of claim 13 further comprising means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning means to said reacting means, and means for recycling at least a portion of said copper-containing lean electrolyte stream from said electrowinning means to said conditioning means..